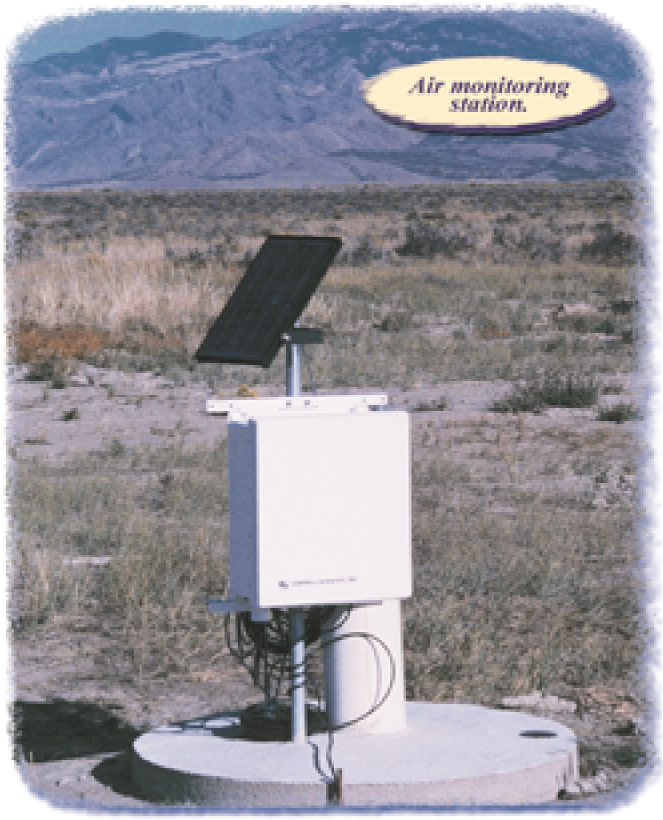


5.2.6 AIR RESOURCES

Air pollutant emissions associated with construction and operation of facilities to support the waste processing alternatives could affect the air resources in the region of the INEEL. DOE characterized air emission rates and calculated maximum consequences at onsite and offsite locations from projects associated with proposed waste processing alternatives. The assessments include emissions from stationary sources (facility stacks); fugitive sources from construction activities; and mobile sources (trucks, cranes, tractors, etc.) that would operate in support of projects under each waste processing alternative. The types of emissions assessed are the same as those in the baseline assessment in Section 4.7, Air Resources, namely, radionuclides, criteria pollutants (carbon monoxide, nitrogen dioxide, sulfur dioxide, respirable particulate matter, and lead), and toxic air pollutants. In addition, DOE characterized emissions of volatile organic compounds (which can lead to the formation of ozone), carbon dioxide (which has been implicated in potential global warming) and fluorides (which can accumulate in forage and feed products).

This section summarizes the assessment methodology and describes the potential effects of construction activities and the operation of proposed facilities on air quality at and around the INEEL. Results of air quality assessments are presented in terms of expected radiation dose and nonradiological pollutant concentration levels which are compared to applicable standards. This section also discusses related impacts, such as potential for visibility degradation and air quality impacts due to project-induced secondary growth. Appendix C.2 contains additional details on assessment methods, assumptions, and related information.

Appendix C.8 describes the potential emissions and impacts that would occur at the Hanford Site as a result of the Minimum INEEL Processing Alternative. For purposes of comparison, the listings of emissions and impacts by alternative presented in this chapter also include the emissions and impacts that would be incurred at the Hanford Site. Unless otherwise indicated, however, the discussions of methodology, emissions and impacts presented in this chapter specifically apply to projected conditions at INEEL.

5.2.6.1 Methodology

DOE assessed the consequences of air pollutant emissions using methods and data that are considered acceptable for regulatory compliance determination by Federal and State agencies and are designed to allow for a reasonable prediction of the impacts of proposed facilities. For the most part, the methodology parallels that used in the SNF & INEL EIS (DOE 1995). In a few cases, however, it was necessary to employ more current methods (e.g., use of more recent versions of computer codes). The principal components of the air resource assessment methodology include source term estimation and characterization of release parameters, which are used in conjunction with local meteorological data and computerized dispersion modeling codes to simulate transport and dispersion of air contaminants. The radiological assessments were performed using the GENII computer code, Version 1.485 3-Dec-90 (Napier et al. 1998), while the nonradiological assessments were performed using the ISCST-3 atmospheric dispersion code, Version 96113 (EPA 1995). A description of the assessment methodology is presented in Appendix C.2.

5.2.6.2 Construction Emissions and Impacts

This section describes the emission rates and impacts that are expected to result from construction of facilities associated with waste processing alternatives. Construction emissions would result primarily from the disturbance of land, which generates fugitive dust, and from the combustion of fossil fuels in construction equipment. As specified by Sections 650 and 651 of Rules for the Control of Air Pollution in Idaho (IDHW 1997), all reasonable precautions would be taken to prevent the generation of fugitive dust. Dust generation would be mitigated by the application of water, use of soil additives, and possibly administrative controls (such as halting construction during high-wind conditions).

Table 5.2-6 presents construction-related emissions estimated for each waste processing alternative at INEEL and the Hanford Site. These emissions are presented as total tons and tons per year. The total ton value represents emissions over the entire construction period of each project associated with a given alternative. The tons per year value is the sum of annual emission rates for each project associated with an alternative. No correction has been applied to account for the fact that not all projects would occur simultaneously; thus, the annual emission rates specified are inherently conservative. These emissions do not include those from construction activities associated with facility disposition (for example, placement of landfill caps), which are addressed in Section 5.3.4.

The primary impact of construction activities involves the generation of fugitive dust, which includes respirable particulate matter. While dust generation would be mitigated by the application of water and soil additives (see Section 5.5, Mitigation Measures), relatively high levels of particulates could still occur in localized areas. Emissions of other criteria pollutants from construction-related combustion equipment may also result in localized impacts to air quality.

Among the alternatives, the highest construction emissions are associated with the Full Separations Option. Under this option, DOE estimates that annual average concentrations of respirable particulate matter would be approximately 1 and 5 percent of the applicable standard at the maximum INEEL boundary and public road locations, respectively. Over shorter periods (24-hour averaging time), respirable particulate levels could reach about 55 percent of the standards at the INEEL boundary. However, it is typical of major construction activities to intermittently produce relatively high levels of fugitive dust in the vicinity of the activity, and short-term, localized levels of particulate matter, which, if not mitigated, could exceed applicable standards. Levels of other criteria pollutants are predicted to be a small fraction of applicable standards. Portions of Bannock and Power counties in Idaho, near the region of influence, are in a non-attainment area for particulate matter.

Construction activities at the Hanford Site (for the Minimum INEEL Processing Alternative) are estimated to produce nitrogen dioxide levels which are about 8 percent of the Federal and State of Washington ambient air standard. All other pollutants would be less than 1 percent of the applicable standard. Respirable particulate matter would not exceed 16 percent of federal or state standards.

5.2.6.3 Radionuclide Emissions and Impacts from Operations

Waste processing and related activities would result in releases of small quantities of radionuclides to the atmosphere at INTEC. For waste processing, these releases would occur in a controlled fashion through filtered exhaust release points. Radionuclide emission rates have been estimated for facilities needed to support waste processing alternatives on the basis of process design, proposed operations, and radionuclide concentrations in the waste to be treated or stored. The specific methods and assumptions

Table 5.2-6. Total and annualized construction-related criteria air pollutant emissions and fugitive dust generation for waste processing alternatives.

				Separations Alternative			Non-Separations Alternative			Minimum INEEL Processing Alternative	
Pollutant	Units	No Action Alternative	Continued Current Operations Alternative	Full Separations Option	Planning Basis Option	Transuranic Separations Option	Hot Isostatic Pressed Waste Option	Direct Cement Waste Option	Early Vitrification Option	At INEEL	At Hanford
Fossil fuel combustion											
Carbon monoxide	tons	7.8	27	350	330	360	280	330	260	210	120
	tons/year	1.6	8.1	110	110	110	82	91	72	54	20
Sulfur dioxide	tons	1.2	4.3	55	53	58	44	52	41	34	0.16
	tons/year	0.2	1.3	18	17	17	13	14	11	8.6	0.027
Particulate matter	tons	0.4	1.5	20	19	20	16	19	15	12	110
	tons/year	0.1	0.5	6.4	6.1	5.9	4.6	5.1	4.0	3.0	19
Nitrogen dioxide	tons	6.7	23	300	290	310	240	280	220	180	120
	tons/year	1.3	6.9	97	93	90	70	78	61	46	20
Volatile organic compounds	tons	1.4	4.9	62	60	65	50	59	47	38	NA[a]
	tons/year	0.3	1.4	20	19	19	15	16	13	9.7	NA
Fugitive dust generation											
Particulate matter (dust)	tons	110	210	2,800	680	2,600	670	910	550	2,600	1,300
	tons/year	22	46	490	200	430	190	240	150	420	220

a. NA = Not analyzed in the TWRS EIS.

used are documented in the Project Data Sheets prepared for each facility (referenced in Appendix C.6). Appendix C.2 provides a description of the general methods used for emissions estimation. The emission rates for individual projects are itemized in Appendix C.2 and summarized by alternative in Table 5.2-7.

DOE calculated radiation doses associated with radionuclide emissions from the proposed waste projects for (a) the maximally exposed individual at an offsite location; (b) the offsite entire population (adjusted for future growth) within a 50-mile radius of the INTEC; and (c) onsite workers at the INEEL areas of highest predicted radioactivity level. The term "noninvolved worker" is used hereafter to describe the worker who is incidentally exposed to the highest onsite concentrations (see Appendix C.2 for further explanation of this receptor). Figure 5.2-2 presents the results of this dose assessment according to alternative. The annual doses presented represent the maximum value calculated over any one year that waste processing occurs.

In all cases, the dose to the maximally exposed offsite individual is a very small fraction of that received from natural background sources and is well below the EPA airborne emissions dose limit of 10 millirem per year (40 CFR 61.92). The highest predicted noninvolved worker doses would occur at the Central Facilities Area and would represent a very small fraction of the occupational dose limit of 5,000 millirem per year (10 CFR 835.202). No applicable standards exist for collective population dose; however, DOE policy requires that doses resulting from radioactivity in effluents be reduced to the levels which are as low as reasonably achievable. The radiological health effects associated with these doses are presented in Section 5.2.10, Health and Safety.

The highest dose to the maximally-exposed offsite individual would be about 0.002 millirem per year, which would occur under the Continued Current Operations Alternative, Planning Basis Option, Hot Isostatic Pressed Waste Option, or Direct Cement Waste Option. The highest collective dose to the surrounding population would be about 0.1 person-rem per year and would also occur under the Continued Current Operations Alternative, Planning Basis Option, Hot Isostatic Pressed Waste Option, or Direct Cement Waste Option. Doses for all other options would be lower. Offsite doses would be mainly attributable to intake of iodine-129 through the food-chain pathway. Emissions of this isotope would result primarily from the calcining of mixed transuranic waste/SBW and management of mixed transuranic waste (newly generated liquid waste and Tank Farm heel waste). The noninvolved worker would receive about 0.0001 millirem per year under the Planning Basis Option or Minimum INEEL Processing Alternative. This dose would be primarily attributable to inhalation of plutonium and americium released from ion exchange treatment of mixed transuranic waste (SBW and newly generated liquid waste), as well as calcine retrieval operations. When added to doses from existing INEEL sources and other foreseeable projects, both onsite and offsite doses remain a small fraction of applicable standards. The highest dose to an offsite individual at the Hanford Site (for the Minimum INEEL Processing Alternative) would be about 1.7×10^{-5} millirem per year.

When the cumulative effects of baseline sources, foreseeable increases to the baseline, and sources associated with waste processing alternatives are considered, onsite and offsite doses remain very small fractions of applicable limits.

5.2.6.4 Nonradiological Emissions and Impacts from Operations

Nonradiological pollutants would be emitted by major facilities and by fossil fuel-burning support equipment (such as boilers, water heaters, and diesel-fueled generators). Criteria and toxic air pollutant emissions have been estimated for each project based on the amount of fossil fuel that would be burned to meet the anticipated energy requirements and the characteristics of chemical processing materials and systems. Emissions are estimated from fuel consumption rates using emission factors recommended by the EPA for fuel-burning equipment (EPA 1998). Fuel usage estimates and chemical process emissions are documented in the Project Data Sheets and supporting Engineering Data Files for each

Table 5.2-7. Radionuclide emission rates (curies per year) for waste processing alternatives.[a]

Radionuclide	No Action Alternative	Continued Current Operations Alternative	Separations Alternative: Full Separations Option	Separations Alternative: Planning Basis Option	Separations Alternative: Transuranic Separations Option	Non-Separations Alternative: Hot Isostatic Pressed Waste Option	Non-Separations Alternative: Direct Cement Waste Option	Non-Separations Alternative: Early Vitrification Option	Minimum INEEL Processing Alternative: At INEEL	Minimum INEEL Processing Alternative: At Hanford[b]
Americium-241	-	-	1.6×10^{-8}	1.6×10^{-8}	1.6×10^{-8}	-	-	-	2.0×10^{-5}	1.5×10^{-7}
Cobalt-60	1.3×10^{-7}	1.2×10^{-6}	2.9×10^{-8}	1.1×10^{-6}	8.2×10^{-9}	1.2×10^{-6}	1.2×10^{-6}	1.3×10^{-7}	9.9×10^{-6}	–
Cesium-134	8.2×10^{-8}	6.3×10^{-6}	3.7×10^{-9}	6.2×10^{-4}	4.8×10^{-8}	6.3×10^{-6}	6.3×10^{-6}	9.3×10^{-8}	1.0×10^{-7}	–
Cesium-137	2.4×10^{-4}	2.7×10^{-3}	2.3×10^{-3}	4.7×10^{-3}	2.3×10^{-3}	0.10	4.9×10^{-3}	2.5×10^{-3}	2.5×10^{-3}	1.2×10^{-4}
Europium-154	2.0×10^{-7}	1.1×10^{-6}	1.1×10^{-9}	9.5×10^{-7}	1.0×10^{-9}	1.1×10^{-6}	1.1×10^{-6}	2.0×10^{-7}	1.0×10^{-5}	–
Europium-155	–	–	4.9×10^{-10}	4.9×10^{-10}	4.9×10^{-10}	–	–	–	1.8×10^{-9}	–
Hydrogen-3 (tritium)	9.0	23.0	45.0	68.0	45.0	23.0	23.0	54.0	32.0	–
Iodine-129	0.031	0.089	1.5×10^{-3}	0.059	4.2×10^{-4}	0.089	0.089	0.032	0.031	9.1×10^{-11}
Nickel-63	–	–	6.9×10^{-12}	6.9×10^{-12}	6.9×10^{-12}	–	–	–	2.6×10^{-10}	–
Promethium-147	–	–	–	–	–	–	–	–	5.2×10^{-5}	–
Plutonium-238	6.2×10^{-6}	1.1×10^{-5}	3.2×10^{-5}	3.7×10^{-5}	3.2×10^{-5}	4.3×10^{-5}	4.3×10^{-5}	3.8×10^{-5}	9.1×10^{-5}	1.8×10^{-7}
Plutonium-239	1.0×10^{-7}	6.7×10^{-7}	2.4×10^{-10}	5.7×10^{-7}	2.2×10^{-10}	6.7×10^{-7}	6.7×10^{-7}	1.1×10^{-7}	3.2×10^{-6}	2.6×10^{-8}
Plutonium-241	–	–	5.6×10^{-8}	5.6×10^{-8}	5.6×10^{-8}	–	–	–	2.3×10^{-9}	8.6×10^{-8}
Ruthenium-106	2.4×10^{-6}	6.6×10^{-5}	1.6×10^{-6}	6.5×10^{-5}	4.6×10^{-7}	7.7×10^{-5}	6.6×10^{-5}	2.5×10^{-6}	2.4×10^{-6}	–
Antimony-125	1.5×10^{-6}	1.2×10^{-5}	7.4×10^{-7}	1.1×10^{-5}	5.5×10^{-7}	1.2×10^{-5}	1.2×10^{-5}	1.5×10^{-6}	5.3×10^{-6}	–
Samarium-151	–	–	2.0×10^{-7}	2.0×10^{-7}	2.0×10^{-7}	–	–	–	2.8×10^{-5}	–
Strontium-90/Yttrium-90	2.1×10^{-5}	3.3×10^{-4}	5.8×10^{-3}	6.1×10^{-3}	5.8×10^{-3}	6.2×10^{-3}	6.2×10^{-3}	5.8×10^{-3}	7.5×10^{-3}	8.0×10^{-5}
Technetium-99	–	–	1.8×10^{-5}	1.8×10^{-5}	1.8×10^{-5}	1.7×10^{-4}	–	–	8.0×10^{-7}	6.0×10^{-8}

a. This table lists only those radionuclides that contribute materially to the total radiation dose associated with airborne radionuclide emissions. Trace quantities of other radionuclides (including carbon-14 and some isotopes of uranium) could also be emitted in some options; however, they would not contribute significantly to the radiation dose. See Appendix C.2 for basis of emissions estimates.

b. Values adapted from Project Data Sheets in Appendix C.8. Emissions of specific radionuclides listed for the Calcine Dissolution Facility were increased by a factor of 2 to account for total radioactivity of calcine (including activity of unspecified radionuclides).

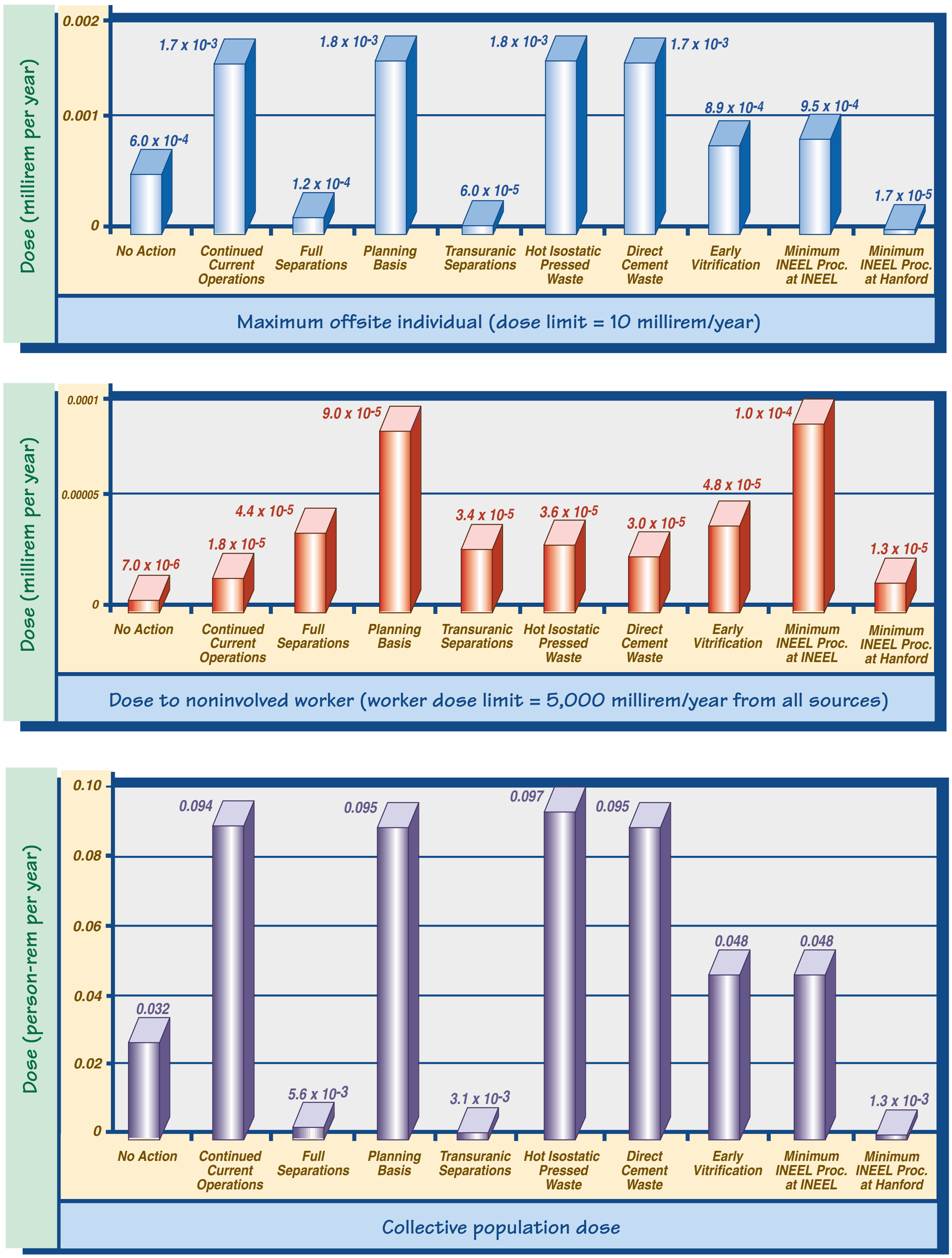


FIGURE 5.2-2.
Comparison of air pathway doses by alternative.

project (referenced in Appendix C.6). The emission rates for individual projects estimated in this fashion are itemized in Appendix C.2, Air Resources, and are summarized in this section by alternative.

Estimated criteria and toxic air pollutant emission rates by alternative are presented in Table 5.2-8 and illustrated in Figure 5.2-3. Criteria air pollutant emission rates are presented as tons per year and are compared to the "significance level" threshold specified by the State of Idaho and the EPA. These emissions result primarily from fossil fuel combustion to produce steam needed for chemical processes and building heating, ventilation and air conditioning. Additionally, emissions result from operation of equipment with internal combustion engines, and from some chemical processing steps. In general, these emissions are lower than those required for steam production. One notable exception is the emission of nitrogen dioxide which historically has been emitted in substantial amounts as a byproduct of the waste calcining process. Although fossil fuel emissions from steam production are assigned to the specific projects which comprise the various alternatives, they would actually occur at the steam production facility. For current operations, the primary steam-producing facility is the Coal-Fired Steam Generating Facility, while backup is provided by oil-fired boilers located in the Service Building Power House. Steam requirements for the waste processing alternatives could be provided either by the Coal-Fired Steam Generating Facility or by a future diesel fuel-fired boiler facility. In either case, the projected criteria pollutant emission rates associated with steam production would not exceed the maximum baseline levels previously assessed (see Section 4.7.4.2). Nevertheless, DOE has assessed impacts associated with these emissions for purposes of comparison between the alternatives.

Toxic air pollutants are produced both by fossil fuel combustion and as byproducts of chemical processing operations. DOE estimated principal carcinogenic (cancer-causing) and noncarcinogenic emissions from fuel burning using the EPA-recommended emission factors listed in Appendix C.2, Table C.2-4. Emissions from chemical processing were estimated by analyzing the material flow through processes associated with each of the alternatives (Kimmitt 1998). Toxic emission rates are listed in Appendix C.2, Tables C.2-12 and C.2-13.

DOE has performed quantitative air quality impact assessments for sources of nonradiological air pollutants, and the impacts are reported below as concentrations at a reference location, averaged over timeframes (hourly, annual, etc.) that correspond to the averaging times specified by regulatory standards. Other potential nonradiological consequences, including the potential for ozone formation, visual resource impairment, climate change (global warming), stratospheric ozone depletion, acidic deposition, and impacts on soils and vegetation are described qualitatively later in this chapter.

The primary goal of the nonradiological impact assessment is to present information which will define the maximum expected impacts while at the same time facilitate comparisons of impacts between waste processing alternatives. Toward this end, only summary information is presented, and minimal emphasis is placed on the contributions of baseline conditions which could obscure the relative impacts of alternatives. Impact results of a more comprehensive and detailed nature can be found in Appendix C.2. The results described in this section focus on the predicted maximum impacts on or around the INEEL (in terms of percentage of applicable standard) for each alternative/option. These impacts include:

- The maximum predicted criteria air pollutant concentrations at ambient air locations (INEEL boundary, public roads, and Craters of the Moon Wilderness Area), which are compared to State of Idaho Ambient Air Quality Standards

- The maximum predicted carcinogenic air pollutant concentrations at the INEEL boundary and Craters of the Moon Wilderness Area, which are compared to State of Idaho Acceptable Ambient Concentrations for Carcinogens

- The maximum predicted noncarcinogenic toxic air pollutant concentrations at ambient air locations (INEEL boundary, public roads, and Craters of the

Table 5.2-8. Projected nonradiological pollutant emission rates (tons per year) for the proposed waste processing alternatives.

Pollutant	Significance Threshold[a] (tons/yr)	No Action Alternative	Continued Current Operations Alternative	Separations Alternative: Full Separations Option	Separations Alternative: Planning Basis Option	Separations Alternative: Transuranic Separations Option	Non-Separations Alternative: Hot Isostatic Pressed Waste Option	Non-Separations Alternative: Direct Cement Waste Option	Non-Separations Alternative: Early Vitrification Option	Minimum INEEL Processing Alternative: At INEEL	Minimum INEEL Processing Alternative: At Hanford
Carbon monoxide	100	1.7	8.1	21	26	13	10	9.5	3.5	3.2	300
Sulfur dioxide	40	23	79	183	257	110	107	97	51	11	27
Particulate matter (PM-10)	25	0.6	1.3	4.7	5.7	2.5	2.1	1.8	0.9	0.4	NA[b]
Oxides of nitrogen	40	6.4	31	62	90	39	92	36	12	5.0	18
Volatile organic compounds	40	0.1	1.0	2.4	2.9	1.6	1.1	1.1	0.2	0.5	NA
Lead	0.6	<0.001	<0.001	0.003	0.004	0.002	0.001	0.001	<0.001	<0.001	NA
Total toxic air pollutants	–	0.6	0.3	1.6	1.5	1.0	0.9	0.9	0.3	0.1	NA

a. Significance level specified by State of Idaho (IDHW 1997) and the EPA; net emissions increases above this level are considered "major" and are subject to additional analyses and air pollution control requirements.
b. NA = Not analyzed in the TWRS EIS.

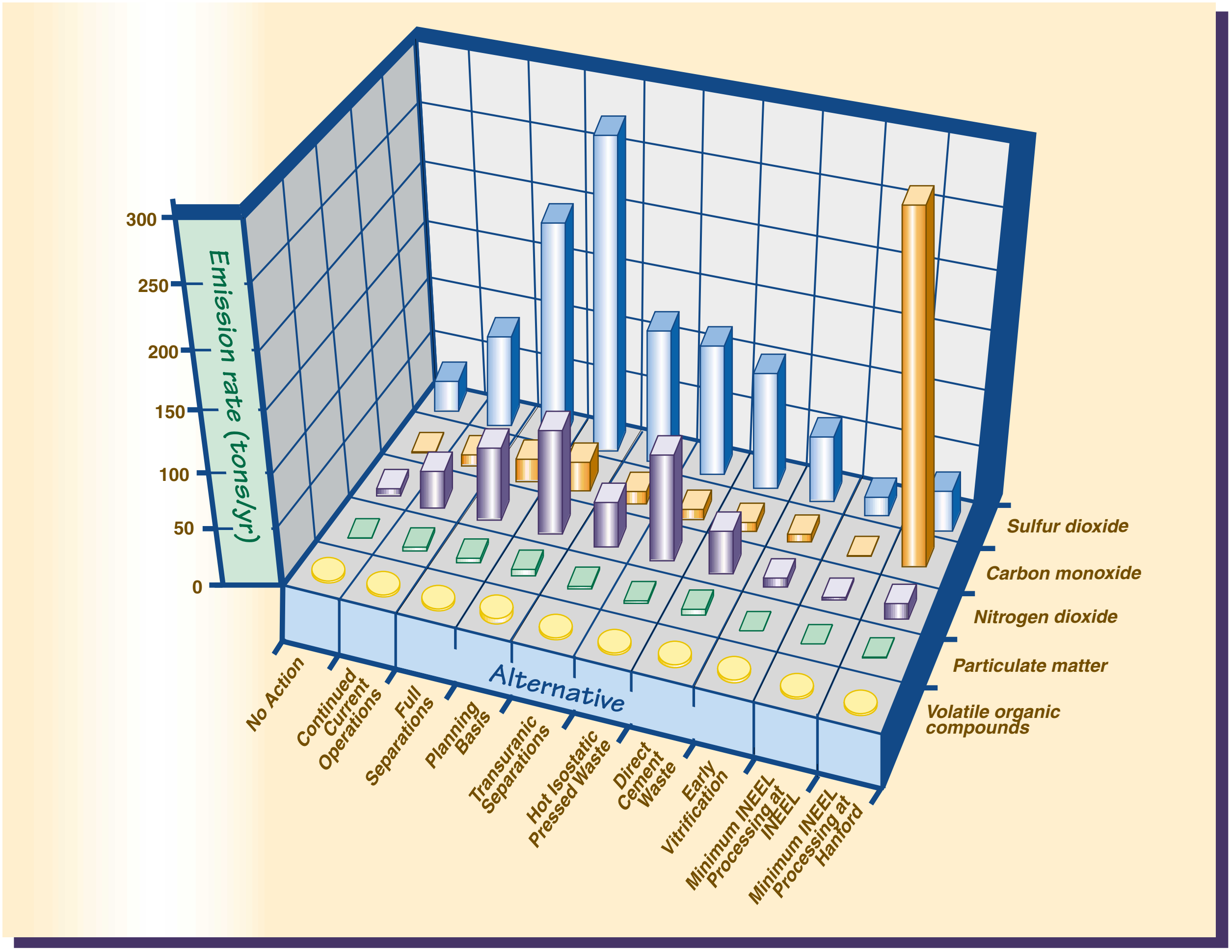


FIGURE 5.2-3.
Comparison of criteria pollutant emission rate estimates by waste processing alternative.

Moon Wilderness Area), which are compared to State of Idaho Acceptable Ambient Concentrations

- The maximum predicted toxic air pollutant concentrations at major INEEL facility areas (e.g., INTEC and Central Facilities Area), which are compared to occupational exposure limits.

Information related to impacts at Hanford is presented in Appendix C.8. Other impacts, including regulatory compliance evaluations of the Prevention of Significant Deterioration increment consumption, impacts on visibility and vegetation, and other air quality-related values are described in Sections 5.2.6.5 and 5.2.6.6. The human health risks associated with these impacts are discussed in Section 5.2.10, Health and Safety. Cumulative impacts that consider projected future changes in air resources (i.e., in addition to baseline levels and alternative impacts), as well as impacts over the entire life cycle of the waste processing alternatives, are described in Section 5.4.7.

The analysis of waste processing alternatives assumes that new oil-fired boilers would be required, either to replace or to serve as backup for the existing Coal-Fired Steam Generating

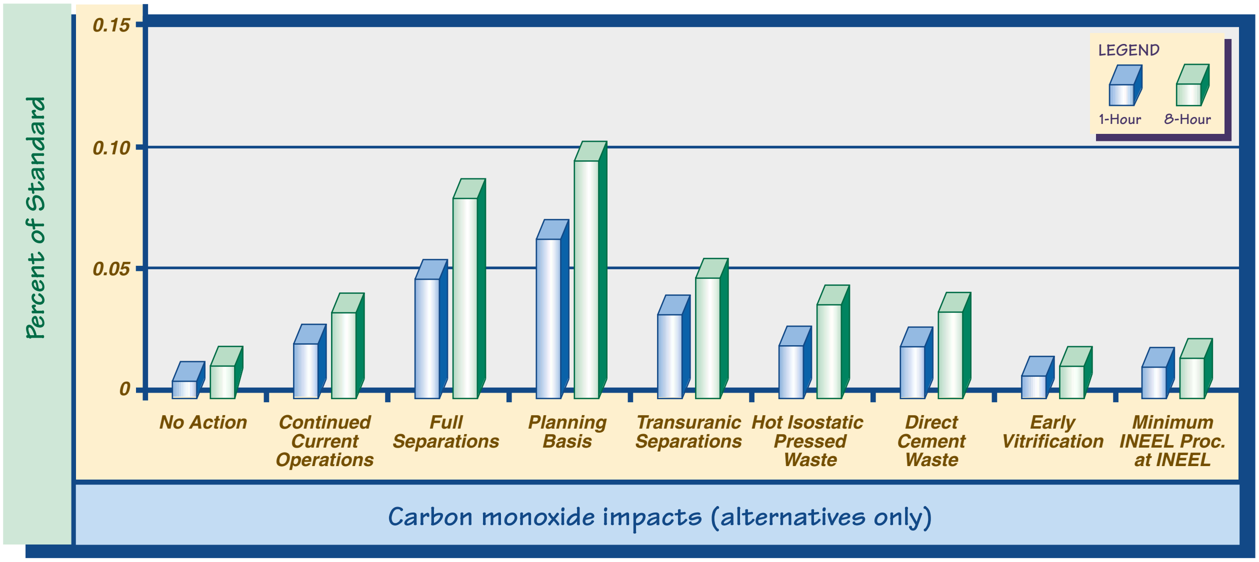
Facility and Power House boilers, and that the sulfur content of the fuel would be 0.5 percent or less. For criteria pollutants, it should be noted that resultant ambient concentrations are bounded in all cases by the maximum baseline conditions described in Section 4.7. The maximum baseline case assumes that all INEEL sources (including the Coal-Fired Steam Generating Facility and Power House) emit pollutants at maximum operating capacity or allowed by permits. Since the Coal-Fired Steam Generating Facility and Power House have the capacity to meet the steam requirements for waste processing alternatives, emission rates and ambient levels are not expected to exceed the levels previously characterized for the maximum baseline. It should also be noted that some changes in the criteria air pollutant baseline are expected. For example, baseline levels of nitrogen dioxide are expected to decrease since the New Waste Calcining Facility calciner (the largest INEEL source of nitrogen dioxide emissions) would not operate beyond 2000 without upgrades to comply with the anticipated Maximum Achievable Control Technology rule. The Maximum Achievable Control Technology upgrades are expected to reduce nitrogen dioxide emission rates to less than 1 percent of previously observed levels (Kimmitt 1993; DOE 1998).

Nevertheless, DOE has assessed the combined effects of emissions from existing facilities and facilities required to support the waste processing alternatives. These evaluations were performed using actual facility emissions data for 1996 and 1997 (Table 4-10) and projected emission rates for facilities required to support the waste processing alternatives (Table 5.2-8). The projected criteria pollutant impacts are presented graphically in Figure 5.2-4. The charts on the top of the page show that these impacts, without consideration of baseline levels, vary somewhat by alternative but are small fractions of applicable standards in all cases. The charts on the bottom show that when the predominant effects of baseline sources are considered, there is little difference between alternatives and all levels remain well below standards.

Figure 5.2-5 illustrates the projected impacts of toxic air pollutant emissions. The highest impacts are projected for those options which involve the greatest amount of fossil fuel combustion, most notably those under the Separations Alternative. The maximum carcinogenic impacts are for nickel while the highest noncarcinogenic impacts are for vanadium. Both of these substances are produced by fuel oil combustion. All levels at both ambient air locations are well below applicable standards, and levels to which noninvolved INEEL workers would be exposed are small fractions of occupational exposure limits. Detailed results for these and other toxic air pollutants are presented in Appendix C.2.

5.2.6.5 Prevention of Significant Deterioration Increment Consumption

Prevention of Significant Deterioration regulations (commonly referred to as PSD) require that proposed major projects or modifications, together with minor sources that become operational after Prevention of Significant Deterioration regulations baseline dates are established, be assessed for their incremental contribution to increases of ambient pollutant levels. Prevention of Significant Deterioration regulations requirements for the State of Idaho are specified in IDAPA 16.01.01.579-581. In essence, a proposed major project, when considered with other regulated sources in the general impact area, may not contribute to increases in pollutant levels above specified "increments." Increments for EPA Class I and II areas have been established for specific averaging times associated with concentrations of nitrogen dioxide, sulfur dioxide, and particulate matter. The INEEL area is designated Class II by Prevention of Significant Deterioration regulations, while the nearest Class I area is Craters of the Moon Wilderness Area. Previous Prevention of Significant Deterioration regulations permits for INEEL site projects have consumed a portion of the available Class I and II increments (see Section 4.7.4). Prevention of Significant Deterioration regulations requirements also



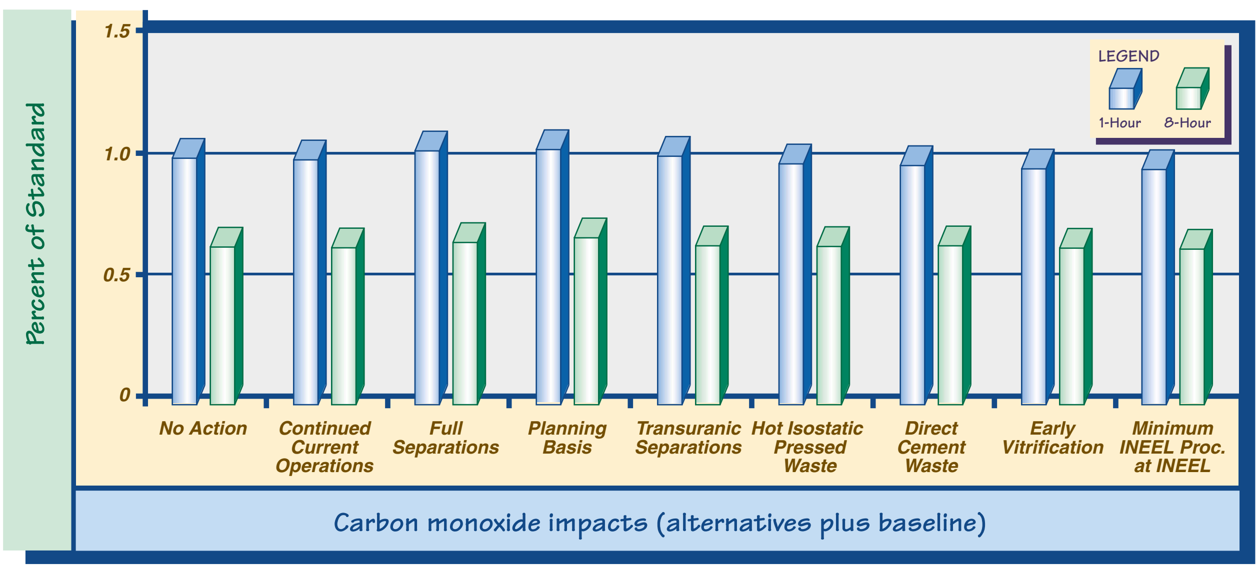
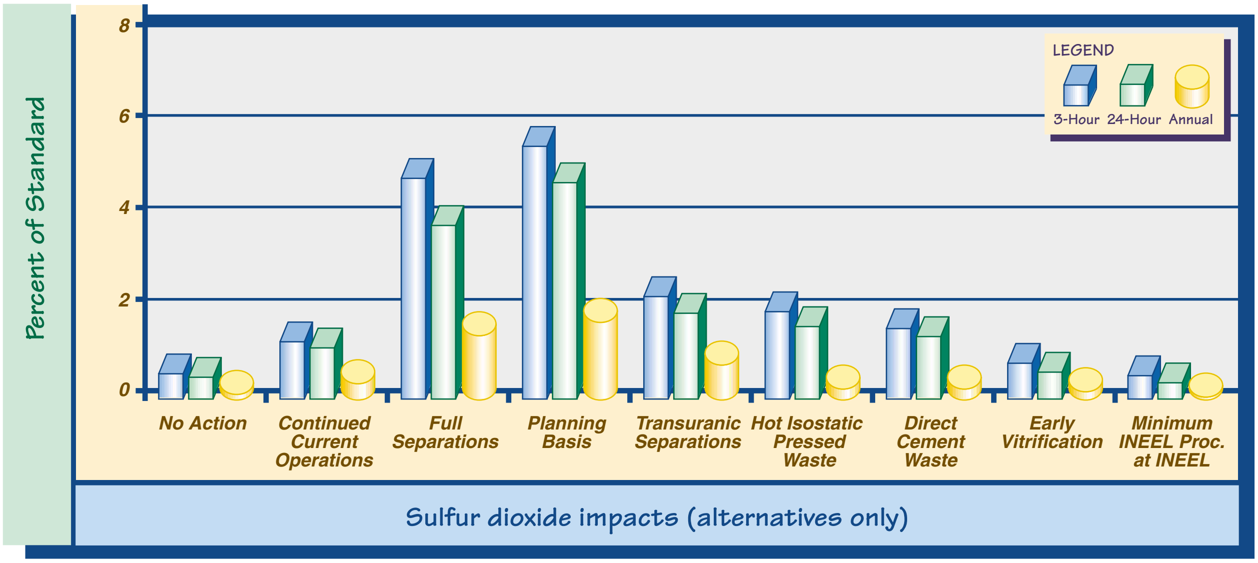


FIGURE 5.2-4. (1 of 4)
Comparison of criteria air pollutant impacts by alternative.



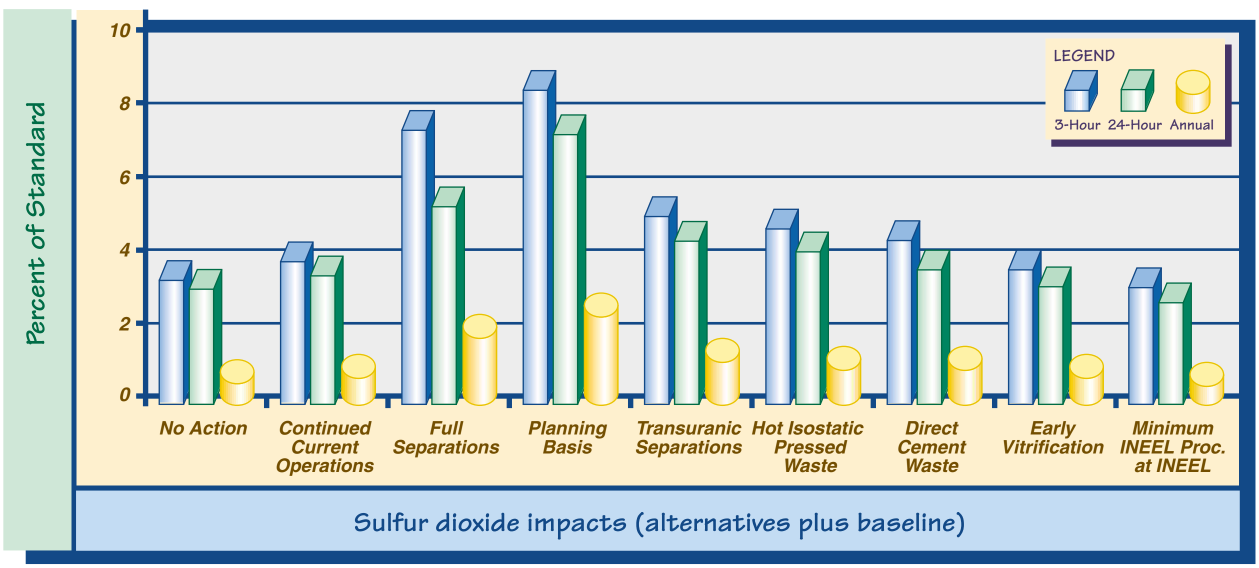
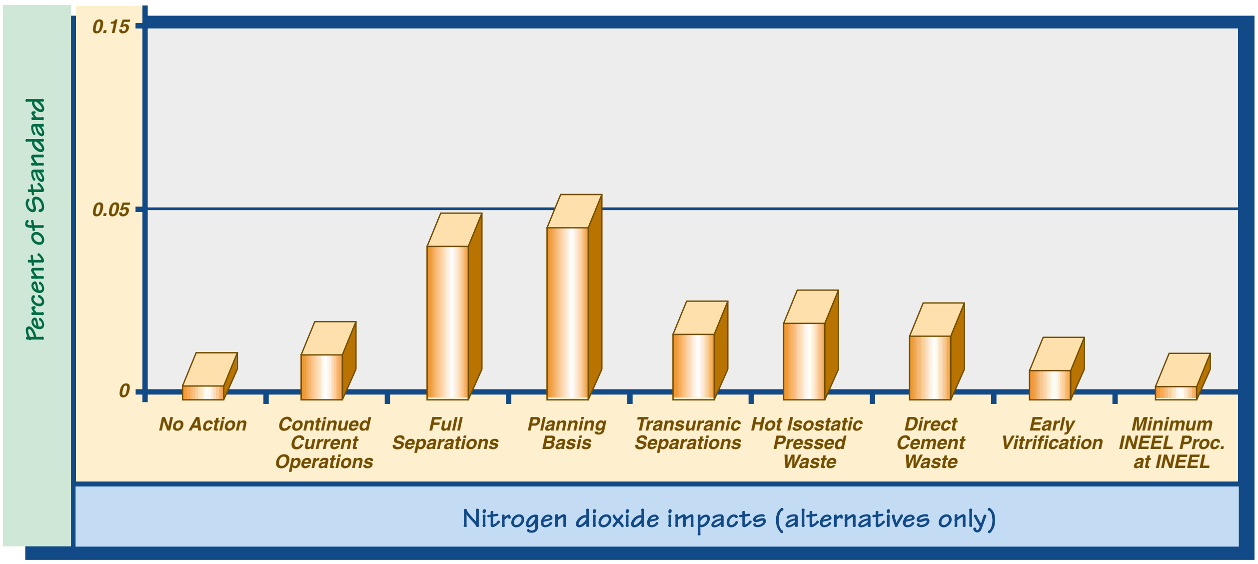


FIGURE 5.2-4. (2 of 4)
Comparison of criteria air pollutant impacts by alternative.



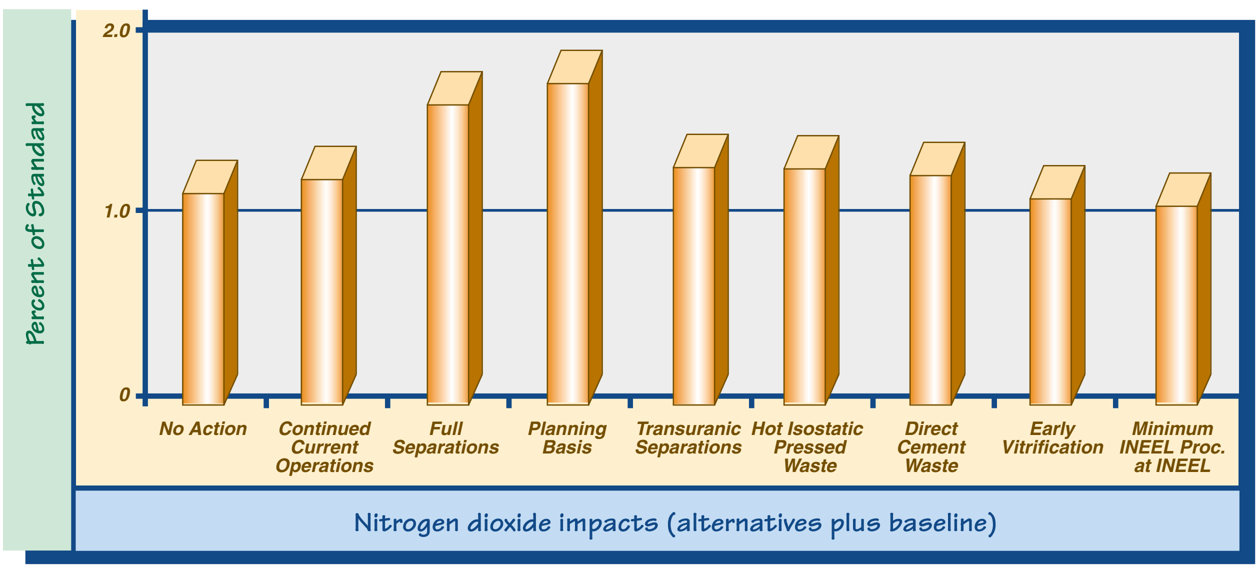
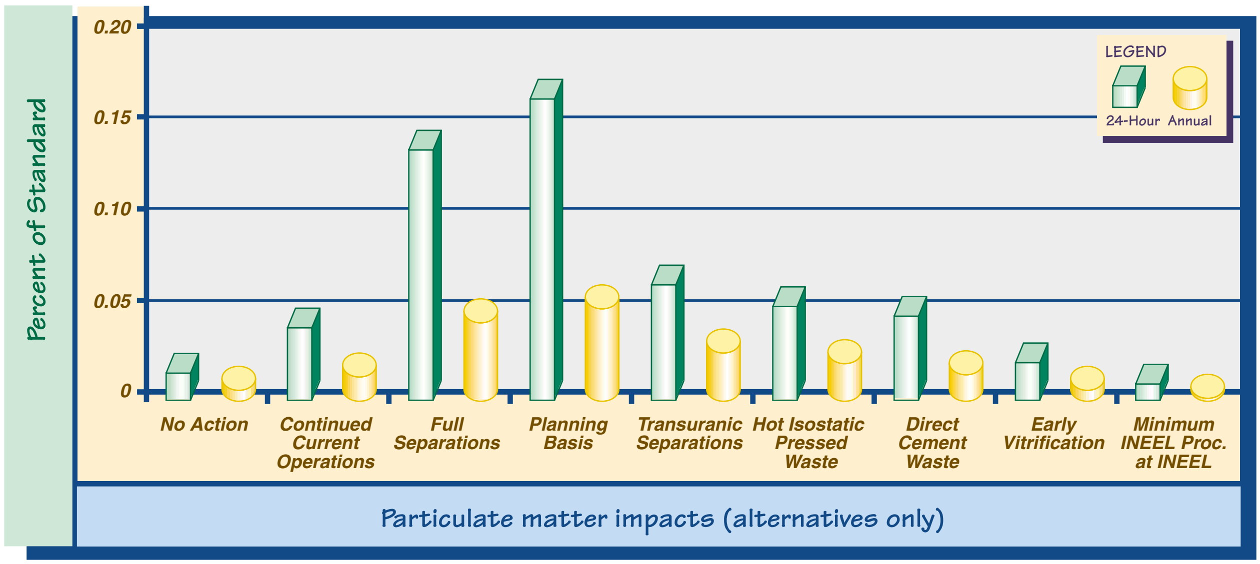


FIGURE 5.2-4. (3 of 4)
Comparison of criteria air pollutant impacts by alternative.



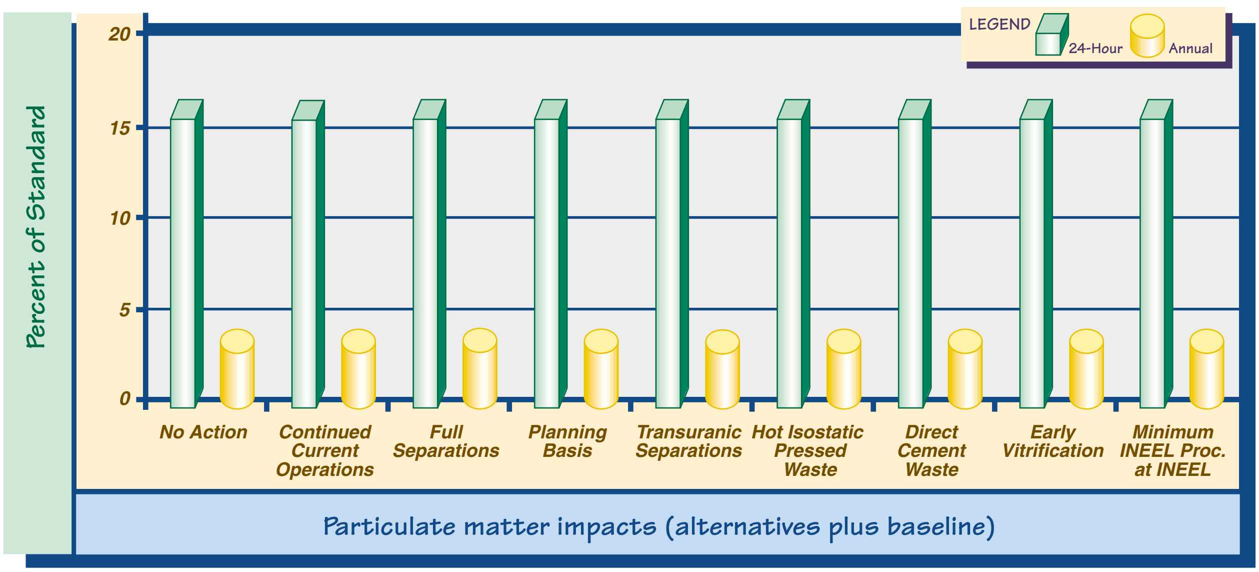
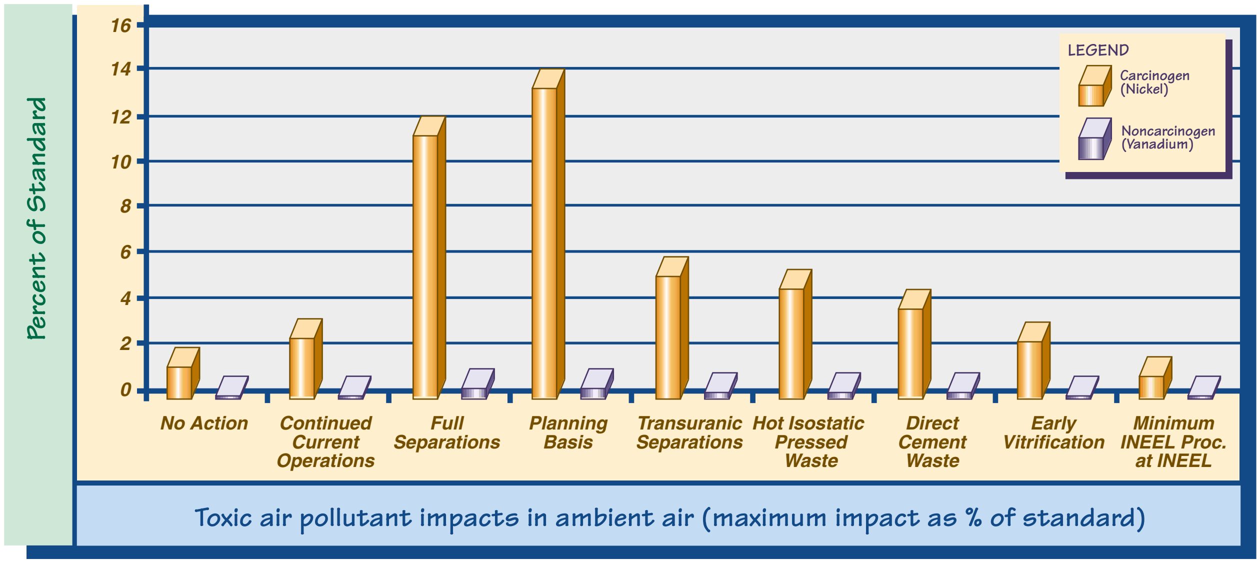


FIGURE 5.2-4. (4 of 4)
Comparison of criteria air pollutant impacts by alternative.



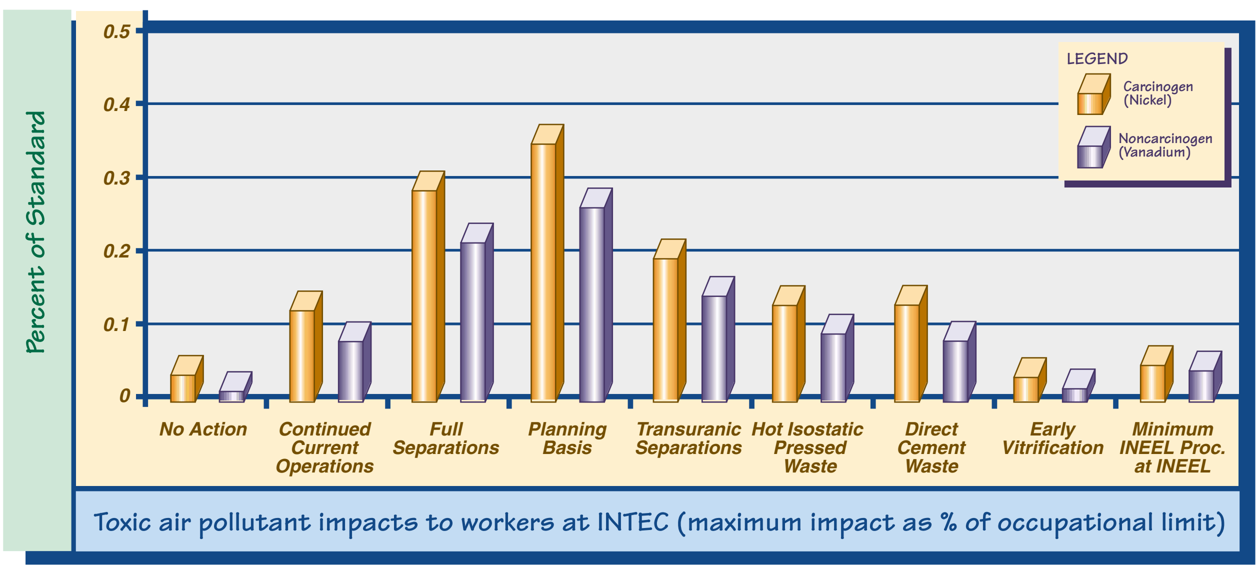


FIGURE 5.2-5.
Comparison of toxic air impacts by alternative.

apply for radionuclides if the projected radiation dose exceeds 0.1 millirem per year. Prevention of Significant Deterioration regulations issues related to the Hanford Site are discussed in Appendix C.8.

The degree to which waste processing alternatives would consume PSD increment depends on whether new fossil fuel burning equipment would be installed to meet project energy requirements. If waste processing steam demand is met by the existing steam plant and Power House, there would be little or no change in increment consumption. The steam plant is regulated under the Prevention of Significant Deterioration program as a sulfur dioxide and particulate matter (but not nitrogen dioxide) increment-consuming source. The Power House is not an increment-consuming source for any of these pollutants, since it was placed in operation prior to the baseline dates that subject a source to regulation under the Prevention of Significant Deterioration program. Current plans call for installation of two new diesel-fired boilers to replace aging Power House boilers. It is likely (although it has not been specifically determined) that these boilers will represent "replacement in kind." As such, they may not be subject to regulation under the Prevention of Significant Deterioration program and therefore, the amount of PSD increment consumed would not differ from the baseline case. Nevertheless, the amount of increment consumption has been assessed for a scenario in which steam for operation of projects associated with waste processing alternatives is provided by new diesel-fueled boilers that would be regulated under the Prevention of Significant Deterioration program. The results are presented in Table 5.2-9.

With the exception of sulfur dioxide, the Prevention of Significant Deterioration program increment consumption does not differ much among the alternatives. This is due to the effects of existing sources and other foreseeable projects, including the planned Advanced Mixed Waste Treatment Facility and remediation activities at the Radioactive Waste Management Complex, including the OU7-10 Staged Interim Action (formerly the Pit 9 Project). Sources located comparatively close to ambient air areas are likely to affect increment consumption to a greater degree than sources at INTEC. For example, the Radioactive Waste Management Complex is much closer than INTEC to Craters of the Moon Wilderness Area.

Sulfur dioxide increment consumption is influenced by some waste processing alternatives since the analysis assumes that fuel oil with 0.5 percent sulfur content would be burned to meet steam requirements. All projected concentrations, both at Craters of the Moon Wilderness Area and at INEEL road and boundary locations, are well within allowable increments.

For radiological Prevention of Significant Deterioration assessments, the projected radiation dose to the maximally-exposed offsite individual is about 0.002 millirem per year for the options involving calcining of mixed transuranic waste/SBW and management of mixed transuranic waste (newly generated liquid waste and Tank Farm heel waste). In all cases, the projected dose is well below the significance level of 0.1 millirem per year.

5.2.6.6 Other Air-Quality-Related Values

The air resources assessments of waste processing alternatives included an evaluation of projected impacts with respect to other air quality related values, including (a) potential for ozone formation (b) degradation of visibility at Craters of the Moon Wilderness Area and Fort Hall Indian Reservation, (c) impacts to soil and vegetation, (d) impacts due to secondary growth (indirect or induced impacts), (e) stratospheric ozone depletion, (f) acidic deposition, (g) global warming, and (h) secondary particulate matter formation. The findings of these assessments are identified below and detailed in Appendix C.2.

Ozone Formation – The Clean Air Act designates ozone as a criteria air pollutant and establishes a National Ambient Air Quality Standard of 0.12 parts per million (235 micrograms per cubic meter) for a 1-hour averaging period. Recently, a more restrictive ozone standard of 0.08 parts per million for an 8-hour averaging time has been promulgated, and this new standard will apply at INEEL. Ozone, unlike the other criteria pollutants, is not emitted directly from facility sources but is formed in the atmosphere through photochemical reactions involv-

Table 5.2-9. Prevention of Significant Deterioration increment consumption for the combined effects of baseline sources, waste processing alternatives, and other planned future projects.[a]

		Highest percentage of allowable PSD increment consumed									
				Separations Alternative			Non-Separations Alternative			Minimum INEEL Processing Alternative	
Pollutant	Averaging time	No Action Alternative	Continued Current Operations Alternative	Full Separations Option	Planning Basis Option	Transuranic Separations Option	Hot Isostatic Pressed Waste Option	Direct Cement Waste Option	Early Vitrification Option	At INEEL	At Hanford
Class I area (Craters of the Moon)											
Sulfur dioxide	3-hour	26%	29%	32%	36%	29%	30%	30%	27%	25%	NA
	24-hour	39%	43%	47%	53%	44%	44%	44%	40%	39%	NA
	Annual	4.7%	5.1%	6.1%	6.6%	5.4%	5.4%	5.3%	4.9%	4.6%	NA
Particulate matter	24-hour	8.8%	8.8%	9.0%	9.0%	8.9%	8.9%	8.8%	8.8%	8.8%	NA
	Annual	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	NA
Nitrogen dioxide	Annual	2.3%	2.5%	2.7%	2.9%	2.6%	2.9%	2.5%	2.4%	2.3%	NA
Class II area (INEEL boundary and public roads)											
Sulfur dioxide	3-hour	19%	20%	25%	27%	22%	21%	21%	20%	19%	NA
	24-hour	20%	21%	27%	29%	23%	22%	22%	20%	19%	NA
	Annual	10%	10%	12%	12%	11%	10%	10%	10%	9.5%	NA
Particulate matter	24-hour	28%	28%	29%	29%	29%	28%	28%	28%	28%	NA
	Annual	0.6%	0.6%	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%	NA
Nitrogen dioxide	Annual	6.2%	6.3%	6.8%	6.9%	6.5%	6.7%	6.4%	6.3%	6.2%	NA

a. Assumes that steam for operation of projects associated with waste processing alternatives is provided by new oil-burning boilers that would be regulated under PSD; baseline emissions do not include those from the Coal-Fired Steam Generating Facility, which would not operate under this scenario.

NA = Not analyzed in the TWRS EIS. PSD = Prevention of Significant Deterioration.

ing nitrogen oxides and volatile organic compounds (also referred to as non-methane hydrocarbons). Therefore, the regulation of ozone is affected by the control of emissions of ozone-producing compounds or precursors, that is, nitrogen oxides and volatile organic compounds. Under the fuel-burning scenario assumed for air analysis, some of the waste would exceed the non-methane volatile organic compound significance level established by the State of Idaho.

Visibility Degradation – Emissions of fine particulate matter and nitrogen dioxide can result in an impairment of visual resources. Emission rates for these pollutants under the waste processing alternatives are not expected to exceed levels currently or previously experienced by INEEL sources; therefore, the "visual impact" of these alternatives is already reflected in existing baseline conditions. Nevertheless, conservative visibility screening analysis has been performed to evaluate the relative potential for visibility impacts between alternatives. This analysis included a quantitative assessment of contrast and color shift parameters and comparison of results against numerical criteria which define potential objectionable impacts. The views analyzed were at Craters of the Moon Wilderness Area and Fort Hall Indian Reservation. The results of the visibility analysis indicate that emissions from each of the waste processing alternatives would not result in deleterious impacts on scenic views at Craters of the Moon Wilderness Area or Fort Hall Indian Reservation (including the view to Middle Butte, an important cultural resource to the Shoshone-Bannock Tribes). The highest results were obtained for the Hot Isostatic Pressed Waste and Planning Basis Options. For color shift, the highest calculated value at Craters of the Moon was about 0.5, compared to an acceptability criterion of 2.0. For contrast, the highest calculated value was 0.004, compared to an acceptability criterion of 0.05. Values at Fort Hall were about one-half the Craters of the Moon values. The calculated values conservatively assume that no abatement systems are present on the fossil fuel-burning equipment used to generate steam; if air pollution control systems are employed (which is a reasonable assumption), these values would decrease in rough proportion to the removal efficiency of the control equipment.

Impacts to Soils and Vegetation – Due to the relatively minor increases in ambient criteria pollutant concentrations, no impacts to local soils or vegetation, including the local sagebrush vegetation community, grazing habitats, or distant agricultural areas, are expected. The National Park Service has issued interim guidelines for protection of sensitive resources relative to air quality concerns (DOI 1994). The highest projected levels of sulfur dioxide and nitrogen dioxide at ambient air locations from any of the waste processing alternatives would be well below the National Park Service guidelines at Craters of the Moon National Monument.

The State of Idaho has established air quality standards intended to limit the concentration of fluoride in vegetation used for feed and forage. Monitoring of fluoride levels would be required unless analysis shows that fluoride concentrations in ambient air, averaged over 24-hour periods, would not exceed 0.25 micrograms per cubic meter. Fluoride emission rates would be highest under the Planning Basis Option. The maximum 24-hour averaged level at any grazing area within or beyond the INEEL boundary is estimated at less than 0.003 micrograms per cubic meter, or about 1 percent of the monitoring threshold. These levels do not include contributions from baseline or other sources. From this, it can be reasonably concluded that fluoride levels in feed and forage would be within the Idaho standards for any of the alternatives. The state may or may not require monitoring to ensure compliance with these standards.

Impacts Due to Secondary Growth – Only minor growth in employee population would result from the construction and operation of the facilities associated with the proposed waste processing alternatives/options. This growth is not expected to be of a magnitude which could result in any air quality impacts due to general commercial, residential, industrial, or other growth.

Stratospheric Ozone Depletion – The 1990 amendments to the Clean Air Act address the protection of stratospheric ozone through a phaseout of the production and sale of certain stratospheric ozone-depleting substances. Ozone-depleting substances would be produced or emitted by the proposed waste processing facilities in very small quantities, and there would be no effect on stratospheric ozone depletion.

Acidic Deposition – Emissions of sulfur and nitrogen compounds and, to a lesser extent, other pollutants including volatile organic compounds, contribute to a phenomenon known as acidic deposition. One form of acidic deposition is commonly referred to as acid rain. Under the Planning Basis Option, emissions of sulfur dioxide from combustion of fuel oil (with an assumed sulfur content of 0.5 percent by weight) could reach levels of about 240 tons per year, while emissions of nitrogen dioxide could reach about 90 tons per year. Emissions would be similar or less under other options (Figure 5.2-3). These estimates do not represent net increases in emissions; rather, they are based on the assumption that No. 2 diesel fuel would be burned to produce steam at a future facility that would replace existing (coal and oil-fired) steam generating facilities. Minor amounts of sulfuric and nitric acids would also be emitted. Emissions of the magnitude projected are not expected to contribute significantly to acidity levels in precipitation in the region nor would they have effects over greater distances, such as may occur with very tall stacks associated with large utility power plants.

Global Warming – Emissions of carbon dioxide, methane, nitrogen oxides, and chlorofluorocarbons (commonly known as greenhouse gases) are associated with potential for atmospheric global warming. Of these, carbon dioxide is by far the most significant greenhouse gas emitted in the U.S. The greatest carbon dioxide emission rates for waste processing alternatives – about 50,000 tons per year – would be experienced for operation of facilities under the Planning Basis Option. This level represents a very small part (less than 0.001 percent) of total U.S. carbon dioxide emissions, which are over 5.5 billion tons per year (USA 1997). Methane, which is present in emissions of unburned hydrocarbons, is also an important greenhouse gas. As in the case of carbon dioxide, maximum annual methane emissions under any of the waste processing alternatives would be a small part of the annual U.S. emissions (about 0.1 tons vs. 34 million tons).

Secondary Particulate Matter Formation – The emissions data and evaluation results presented earlier in this section included data and results for particulate matter. Those data and results apply only to "primary" particulate matter, which refers to particles directly emitted to the atmosphere in particulate form. Particulate matter may be formed in the atmosphere from reactions between gas-phase precursors in the exhaust stream, and this is referred to as "secondary" particulate matter. This secondary particulate matter can either form new particles or add particulate matter to pre-existing particles. Secondary particulate matter is usually characterized by small particle sizes and thus can make up a significant fraction of very fine particulate matter (i.e., particulate matter with a particle size less than 2.5 microns, for which no standard has been implemented).

Predicting the amount of secondary particulate matter formation is difficult. Secondary particulate matter usually takes several hours or days to form, and the resultant concentrations are not necessarily proportional to the amount of precursors emitted (STAPPA and ALAPCO 1996). Of the pollutants that are expected to exist in waste processing facility exhaust streams, sulfur dioxide and nitrogen oxides are precursors for some types of secondary particles. Air pollution program officials have used values of 10 percent for the conversion of gaseous sulfur dioxide into secondary sulfate aerosol, and 5 percent for conversion of gaseous nitrogen oxides into secondary nitrate aerosol (STAPPA and ALAPCO 1996). If conversion values of this magnitude are assumed for projected waste management alternatives, and considering the relatively long time required for conversion, the previously described particulate matter-related impacts (i.e., consumption of Prevention of Significant Deterioration regulations increment at Craters of the Moon or around the INEEL, and compliance with 24-hour and annual average ambient standards) would increase by no more than a few percent. Since all projected concentrations are well below applicable ambient air quality standards, increases of this magnitude would not alter the regulatory compliance status of these alternatives.

5.2.6.7 Air Resource Impacts from Alternatives Due to Mobile Sources

The ambient air quality impacts at offsite receptor locations due to the INEEL bus fleet operations, INEEL fleet light- and heavy-duty vehicles, privately owned vehicles, and heavy-duty commercial vehicles servicing the INEEL site facilities were assessed in the SNF & INEL EIS. The mobile source impacts associated with the proposed waste processing alternatives are bounded by those associated with the Preferred Alternative described in the SNF & INEL EIS. The assessment in that EIS indicated that the Preferred Alternative would result in some minor increase in service vehicles and employee vehicles, especially during construction activities. The peak cumulative impacts (baseline plus future projects) were due almost entirely to existing traffic conditions and were found to be well below applicable standards. The proposed waste processing alternatives in the Idaho HLW & FD EIS are expected to have little or no impact on traffic volume at the INEEL and would produce only a small increase in vehicular-induced air quality impacts.